AN HISTORICAL AND CRITICAL STUDY

OF

RADICAL BEHAVIORISM AS A PHILOSOPHICAL DOCTRINE

By

FRANK DIEHL

A DISSERTATION

Submitted to the Board of University Studies of The Johns Hopkins University in conformity with the Requirements for the Degree of Doctor of Philosophy, 1932

Baltimore

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NOTE

The folowing pages are portions of a dissertation in the Library of the Johns Hopkins University; being the complete Table of Contents, a section of the Introduction, aud chapters 15 and 16 of Part II.

The author is greatly indebted to Professor A. O. Lovejoy and to Professor George Boas for their helpful criticisms and stimulating influence. He has derived especially great profit from the teaching and the writings of Professor Lovejoy under whom the major part of his work was done.

ERRATA

P. 2 1st line "folowing" should be "following."
P. 6 line 13 from bottom, omit "all."
P. 8 line 15 from bottom, insert apostrophe (') after "behaviorists."
P. 9 line 9 from top after "problem," insert "of".
P. 9 line 13 from top, should be "stimulus" instead of "sitmulus."
P. 14 line 17 from bottom, insert "out" instead of "uot."
P. 16 line 7 from top, insert word "nothing" between "as" and "more".

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A SECTION OF THE INTRODUCTION, CHAPTER I

This dissertation attempts (1) to trace the origins of the radical behavioristic movement, and (2) to give an evaluation of this movement. At the outset it will be necessary to distinguish between behaviorism as a psychological method of investigation and procedure on the one hand, and behaviorism as a metaphysical theory on the other hand—either a metaphysical theory as critically and consciously developed, e. g., by Professor A. P. Weiss, or a metaphysical theory as more or less consciously but uncritically assumed, e. g., by Dr. John B. Watson and other behaviorists; any radical behaviorism, however, carries with it very definite metaphysical implications. As a method, radical behaviorism is interested solely in objective laboratory technique and, where this is not possible, in objective observation; it seeks to eliminate entirely from psychology the subjective and the introspective. It will not take into consideration consciousness or any conscious element or factor. Whether this method as psychological method is tenable, we shall inquire later. As a metaphysics, or as a system with metaphysical implications, radical behaviorism is naturalistic in the sense that it limits itself to the physico-chemical or the physiological events in the organism, to physical but not necessarily in all cases, observable behavior. In this dissertation, we shall concern ourselves principally with the metaphysical, epistemological and ethical issues involved, and only incidentally with the methodological issues.

PART II

Chapter 15

CRITICISM OF THE CONCEPTION OF BEHAVIOR AS A STIMULUS-RESPONSE PROCESS

Since radical behaviorists define phychology as the science of behavior, and furthermore define behavior as a stimulus-response process, it is highly essential that we consider critically the terms 'stimulus' and 'response' as used by the behaviorists.

Criticism of the Behavioristic Conception of Stimulus

The behavioristic use of the term 'stimulus' is very loose and ambiguous. According to Bentley* the behaviorist makes three assumptions, which we shall take the liberty of reformulating more sharply and clearly: (1) identification or blending of the stimulus with cause; (2) "barring 'resistance' in the nervous system, every stimulus gives rise to an 'effector' response"; (3) a stimulus "may be as wide as the undefined" and undifferentiated environment. Let us take up each of these in turn for closer scrutiny.

(1) *Identification of stimulus with cause.* As Woodworth points out† a stimulus is not identical with the cause. We can readily see how this is so, if we bear in mind all the many factors in an act of perception, for instance. Of course, the radical behaviorist in his highly simplified point of view regards the stimulus simply as the cause of which the response is the effect. He can do this because he looks upon the organism merely as a complicated mechanism, just as the electric door-bell and its connections, for example, is a simple mechanism; in the case of the door-bell, when we press the button, that is the stimulus, i. e., the cause; as a consequence, the circuit is closed and the bell rings. The ringing of the bell is the response, or effect; by way of analogy this mechanical process of cause and effect is transferred from the universe of discourse of physics into the universe of discourse of biology, and from thence it is carried by the radical behaviorist over into the still more different and yet more complicated universes of discourse of psychology and philosophy. We behold here a beautiful illustration of the fallacy of pseeudo-simplicity. As a matter of fact in perception, the term 'stimulus'

*The Major Categories of Psychology (Pres. Address delivered before the Amer. Psychol. Ass'n, Ithaca, N. Y.), Psychol. Rev., 1925, pp. 71-105.

†*Psychologies of 1925*, p. 122f

as used by the radical behaviorist includes also the factor of awareness by the organism, the factor of meaning for the organism, the remembered sensings of past contacts, the integrative action of the organism in organizing all these factors into one whole, as well as the mutual interplay between stimulus and response on other occasions, and other stimuli and responses in one vast net-work of relations; all of this ensemble is involved in perception and the complicated tissue of relationships into which the stimulus as one factor enters. But all this is slurred over by the radical behaviorist by his forthright identification of stimulus with cause. He achieves this highly simplified result by reading out of the situation many of the factors which a more correct and discriminating psychological and philosophical analysis finds obviously to be there. That is, he does this when he is expounding for us the foundations of his science and its difference from other points of view; but when he comes to apply his use of the term 'stimulus' to actual concrete situations in human life, he unconsciously but nevertheless illicitly brings in by the back door all that he had previously publicly kicked out at the front door. We shall see this especially when we come to consider the third assumption in the behaviorist's use of the term 'stimulus'. The result can breed nothing but confusion.

(2) *"Barring 'resistance' in the nervous system, every stimulus gives rise to an 'effector' response."* In 1916 Dr. H. O. McComas wrote an article entitled "Extravagances in Some Motor Theories of Consciousness".* According to him, the extravagance consists in "the insistence that a motor expression accompanies all conscious processes. No one will deny that there is a deep-seated tendency for the incoming impressions to go out into motor expressions; but there is nothing more than a tendency." But it is mistake "to push this principle to an extreme, ... to make it an open sesame into the most intricate problems in psychology." The emphasis on the motor theories is due to the influence of biology. The ideal of the "motorist" is all that "if we ignore the cortex and consider the structure of the afferent and efferent tracts, the two sets of tracts have equal tasks," that "they are parts of one circuit, or process, the motor being as active and important as the sensory." Drop out all reference to consciousness and make the motor even more important than the sensory, or rather in order to have behavior, to have thinking say that the sensory-motor or simulus-response process is the indispensable unit and we have behaviorism full-grown. All that McComas has further to say in the way of criticism applies to it also. With reference to the doctrine that "the afferent and efferent tracts have equal tasks" that "they are parts of one circuit or process", McComas says: "anatomically, nothing of the kind exists. The

*Psychol. Rev. 23, 1916, pp. 397-406.

sensory tracts outnumber the motor by three or four to one, and there are more neurones in the former than in the latter. Moreover, when we compare the complexity of the sense organs with the simplicity of the muscles and glands the disparity is overwhelming. . . . It is inconceivable that each fibre in the basilar membrane, affording over twenty thousand discriminable tones, should have its accompanying little movement with a meaning all its own."(1) McComas's inference is fully justified, when he says: "Surely, no one would venture to predict the stimuli, given the responses, in that melee of confusions," and we may add to McComas's inference 'or vice versa'. It is perfectly obvious, then, that Watson's hope that behaviorism can be made into a science of prediction just as objective and certain as any physical science is in the nature of the case impossible of realization. We shall see this conclusion more and more confirmed as our criticism of behavior as a stimulus response process proceeds.

Woodworth* approaches our topic from a somewhat different angle when he says that the real units of behavior are not stimulus response processes, but rather response units, for, as he pertinently points out: (1) a given response may be aroused by a number of different stimuli, (2) the same stimulus may arouse very different responses depending upon (a) the state of the organism (b) the interest or preoccupation of the organism at different times, etc.

Dunlap† singles out two assumptions amongst others of the radical behaviorists:—(1) that the thought reaction is practically limited to the language reaction (2) "that complete reaction is in all cases necessary to thought." He holds "that neither one of these assumptions is as yet justified." We have already abundantly shown in our discussion of the bearing of the phenomena of aphasia, etc., upon the behavioristic theory of thinking that the thought reaction and the language reaction are not identical. The second assumption which Dunlap mentions here finds its appropriate place at this point in our discussion. According to Dunlap, then, there may be cases in thought in which stimuli do not issue in responses, and yet there is thinking going on. The peripheral sensory theory of mental development of Head and Dunlap, as we saw in the section on aphasia and the behavioristic theory of thinking, also points in the same direction. For thinking, then, the afferent or sensory processes are more important than the efferent or motor.

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(1) We might add to the examples given by McComas, the example of the retinal processes:—what would be the motor processes corresponding to each one of these?

**Psychologies of 1925*, p. 122ff

†*Psychologies of 1925*, p. 320

(3) *A stimulus may be as wide as the "undefined" and undifferentiated environment.* It is notorious that the radical behaviorist applies the term 'stimulus' to such a wide variety of very different things, as to deprive the term of all significance. For instance, Weiss in discussing "the stimulating conditions",* says: "These may be as simple as that of a loud sound, or as complex as that of an archaeological record. . . . In their simplest form stimuli are classified as light waves, sound waves, movements, durations, temperatures, vapors, solids, liquids, gases, and in combination they form the physical and chemical properties. In their complex form stimuli are the objects, situations, and events, which form or have formed the environment." Thus according to Weiss and the other radical behaviorists, a stimulus may be any one of the following: a certain amount of energy delivered at the receptor, a sensory cue, an immediate sense datum, a perceived object, a more or less complicated situation either in the external environment, or internal state of the organism, a social milieu, a social institution, a present state of affairs, or even a future states of affairs, or a prospect (e. g., having a wife and children as a stimulus for learning a trade or a profession—Cf. Allport: Social Psychology) ; Watson lists amongst other the following as stimuli: "overthrow of monarchy, formation of soviet government, war, prohibition, easy divorce, no marriage, children brought up in ignorance of their parents."† One of the most interesting and curious specimens to add to this museum of stimuli is found in Watson's recent article in the Encyclopedia Britannica‡: "In the more complicated reactions, especially labelled 'social' the S-R (S=stimulus, R=response) relationships are not very easy to solve, e. g., present the stimulus 'prohibition' (S) to any given nation, what will the response (R) be? It will take years to determine R completely. Many behaviorists problems have to wait for their solution upon the slow experimentation of science as a whole." When the term stimulus is spread out as thin as this and becomes so elastic it is emptied of all meaning. We need not be surprised to learn, then, that in a social situation the response of one individual may become the stimulus for another individual. As Bentley says further: "Thus a very great deal is included beside the immediate physical event at the receptor. . . . That all these trappings of the universe labelled stimulus, stimuli may reasonably and sensibly be brought under the category of physical existence is usually assumed, not demonstrated by the behaviorist."** Weiss's well known device which serves him as bridge to get over from the physical to the non-physical is the term 'biosocial'. But this is after all a mere verbal label, which instead of solving the riddle only states it in

*_Theoretical Basis of Human Behavior_, 2nd ed., p. 144
†_Behaviorism, 1924_, p. 32
‡14th Ed.
**Major Categories of Psychology, _ibid._

another form. We agree with Bentley when he says: "Though defined as a form of movement, the response is thus allowed by this magical transformation to become a word and so to 'stimulate another'. Here naive monism carries us a step further. In order to escape the bogs of the psychical, our author identifies the air-changes at the neighbor's ear with the luncheon invitation and so this invitation becomes not only a promise of a gay hour but also a (bisocialized) stimulus. He verbally escapes the hateful problem 'meaning' by using the word 'significance' and the 'understanding' of the neighbor's generous intent by 'observing' his social status."*

McDougall's Distinction Between a Stimulus and an Object

McDougall makes an important distinction between a sitmulus and an object.† When, e. g., some particles of pepper enter my nostrils and cause me to sneeze, "even though I do not perceive the odor or the irritation" this is a response to a stimulus. "But, if I perceive the odor and the irritation and then blow my nose, that is behavior initiated by perception, a purposive reaction upon an object." That is, he goes on to point out, there is involved synthetic activity such as enters into an act of perception, in fact is "the essence of perception."

In a footnote‡ McDougall says further: "Starting out with the formula that all behavior is a reaction to a 'stimulus', the mechanistic theorist is apt to ignore altogether this highly important distinction between 'stimuli' and 'objects'. This abuse of the word 'stimulus' reaches its extreme when the mechanists seek to bring, say, the political or religious activities of man under the stimulus-response formula by describing his system of political or religious beliefs as an internal institutional stimulus."

Behavioristic use of 'response' equally vague and ambiguous. The behavioristic use of the term 'response' is as indiscriminating and confusing as the use of the term 'stimulus'. According to the behaviorist a response may take any one of these forms: a muscular movement, a bodily movement from one place to another, a glandular secretion, biophysical reactions which are analyzable into physical, anatomical and physiological components (Weiss), an angry man striking another man perhaps knocking him down, approaching reaction, e. g., members of the opposite sexes embracing each other, manipulations of objects, verbal and language responses, visceral reactions, Watson's list in part: marriage, continence, joining the church, and truthful-

*The Major Categories of Psychology, *ibid.*

†*Outline of Psychology*, pp. 75ff

‡*Ibid.*, p. 77

ness*: Weiss's biosocial reactions "which are analyzable into ontogenetic, phylogenetic and social components"; as in the case of the 'stimulus' the list can be extended indefinitely until it comprehends all the activities and reactions of man both distributively and collectively; we shall content ourselves with adding only a few more curious specimens to the list, the complements to Watson's 'prohibition' stimulus applied to the nation, namely: the nation's possible responses: the law-abiding spirit manifested in obedience to the eighteenth amendment, or the spirit of lawlessness as manifested in disregard of it. We might continue in the same spirit and mention 'boot-legging', 'rum-running', etc. We behold here, it is obvious, the same confusion and confounding of the physical and non-physical, or the quantitative and qualitative as in the case of the term 'stimulus'. This inconsistency comes out sharply in Allport's Social Psychology and in Weiss's Theoretical Basis of Human Behavior. When Allport in the earlier chapters of his book is setting forth the transition from psychology to social psychology, he first of all rests his case on the stimulus-response process, expounding this process wholly in psysico-chemical terms, and denying any efficacy whatever to consciousness; he explains, for instance, in a footnote† that when a hungry man eats, his consciousness exerts no casual efficacy at all. "The cause of going to the table lies in the sequence stomach-stimulation (i. e., hunger contractions of the stomach walls)—nerve transmission (sound of the dinner bell)—reaction (walking to the dining-room, sitting and eating)." Obviously by 'cause' Allport means mechanistic or mechanical cause. To the unsophisticated person it would appear obvious that Allport is clearly wrong in his interpretation of this illustration, for may not consciousness exert a teleological influence? Furthermore, in discussing the nature of stimulation in social psychology, Allport says, that the interstimulation between persons is always physiological and never mental nor conscious interstimulation, "for no type of stimulation other than the physiological exists."‡ The correct position, however, would seem, in contradistinction to Allport, to be that in social psychology, we are primarily interested in mental interstimulation, that is, in the contact of mind with mind-mental interstimulation, to be sure, through the instrumentality of, or conditioned by physiological processes. In this physiological interstimulation, Allport goes on to say: "Consciousness exerts no influence and therefore explains nothing in mutual reactions of human beings. In social psychology, as in non-social branches of the science, its rôle is descriptive rather than explanatory." And yet strange to say, he is at pains to

**Behaviorism*, p. 33
†p. 2
‡*Ibid.*, p. 12

emphasize* that "the element of social consciousness, however, will by no means be neglected in the following chapters. . . . A special chapter also will deal with social consciousness as an interest in itself." He even goes so far as to define social psychology as "the study of the social behavior and the social consciousness of the individual."* Throughout the whole of the first part of the book (pp. 1-141) and especially in the long chapter on 'Fundamental Activities—Inherited and Learned' he develops in outline a thoroughly radical behavioristic system of psychology.

In Part I, then, Allport appears to pay only lip service to consciousness. When, however, in the latter part of his volume, he comes to the consideration of the real problems of social psychology, he makes this inefficacious consciousness basic for his whole system. It seems that after all it is tremendously efficacious, that without it we could not explain the phenomena of social psychology. The evidence for this statement is as follows:

1. He gives an excellent account of the "genetic development of social consciousness and the social self" from infancy to maturity.† He says that "Professor Baldwin and others have pointed out a stage in which the child is conscious of those about him, not only as sources of important and pleasant stimulation, but as selves similar to his own." Thus, e. g., "the child who is familiar with the pain of a burn can sympathize with the same feeling when he sees another burned and observes the expression of pain. There is thus developed an awareness of an environment composed of selves similar to his own." . . . This stage has been "called the 'ejective stage' of self-consciousness." Then follows a passage of such importance in this connection, that we shall quote it in full: "Ejective consciousness is of fundamental importance in human society. Its possession, according to Professor Washburn, not only distinguishes the child from the social infant, but places the social psychology of man upon a different plane from that of the lower animals. Instead of responding like the latter, merely to the overt acts of his fellows, man is able to respond by sympathetic reaction to the evidences of thought and feeling. It is possible therefore to establish permanent attitudes for our behavior toward others, attitudes based upon a standing knowledge of how others habitually feel and think concerning various matters. *Upon ejective self-consciousness is founded therefore that stable regard for others which is the very basis of the social life.*"[1]

The important point to notice here is that while the animals can respond only in a radically behavioristic manner, man, on the other hand, can, thanks to the "ejective consciousness", respond by sympathetic reaction to the evidences of thought and feeling.

**Ibid.*, p. 12

†*Social Psychology*, p. 330ff

1*Italics, mine.*

Needless to say, such an "ejective consciousness" has no place whatever in radical behaviorism. Nevertheless in the italicized sentence above, it is stated as emphatically as possible that it is the very basis of the social life.

2. Allport describes the function of this 'eject' in a somewhat different way when he portrays the "looking-glass self", the *"social self."** He says: "Stated in introspective terms, we are conscious of what we infer to be in the consciousness of others concerning us. Our consciousness of ourselves is largely a reflection of the consciousness which others have of us. This introspective phase of the self has been aptly termed by Professor Cooley the "looking-glass self." Allport prefers to call it the *"social self."* Allport continues: "My idea of myself is thus largely my neighbor's idea of me, or rather my own idea of my neighbor's idea of me. To this we may add that 'my idea of my neighbor's idea' is usually what I *want* my neighbor to think. . . . The interrelation of social attitudes is thus both complex and vital. Attitudes of others toward us whether real, supposed or only wished, *control both our self-consciousness and our personal conduct."*[1]

The moral in regard to the social self, then, is "that our social self really originates in our own efforts to establish opinions and attitudes regarding us in others. The traits and possessions which we ourselves value we desire to place in the forground of the consciousness of others in their evaluation of us."*

Again, Allport says: "The pattern of the social consciousness is complex and subtle. Because of its omnipresence in our lives it is seldom clearly distinguished from other conscious data. . . . but forms a vague background of daily experience, giving a social tinge to our feelings, thoughts, attitudes and acts. It is so fleeting *that it is difficult even for the trained introspectionist to analyze."*[1]†

Both the fact of introspection and "the introspective terms" which appear in these passages are, of course, at the opposite pole from radical behaviorism.

3. When Allport is seeking to explain how the same individual's attitude of responding differs when in a large crowd from what it is when in a small crowd, he attributes the difference to what he calls the *impression of universality.* The essential factor in this *impression of universality,* according to Allport is mental imagery. He quotes with approval Dr. W. D. Scott's statement in introspective terms[2]: ‡"If the speaker has presented an idea

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**Ibid.*, p. 325
[1]*Italics, mine*
**Ibid.*, p. 326
†*Ibid.*, p. 330
[2]Allport himself characterizes it thus
‡*Ibid.*, p. 306

in the form of a mental image, and I am a member of the crowd, the idea then seems to be presented *to each individual,* for I feel that each of them is thinking the thought and seeing the picture just as the speaker presented it, and hence it is in a sense presented to me by all those present. Since the idea as presented is assumed by me to be accepted by all present, it would be absurd for me to question it."

About everything in this passage should be taboo to the radical behaviorist: mental image, idea, the introspective method of analysis and underlying it the 'eject'.

4. Allport also finds the 'ejective consciousness' manifesting itself in what he calls 'social projection'. When we are in a crowd and listening to a speaker, "as we catch a glimpse of the expressions of others we 'read into them' the setting which for the time is dominating us. . . . *We ourselves accept and respond to the words of the leader; and therefore we believe and act upon the assumption that others are doing so too.*"[1] Allport, then, gives in this connection a few illustrations from daily life: "The bashful youth 'projects' his intense consciousness of himself into those about him and thus becomes embarrassed and timid. The swaggering individual and the adolescent, holding personal conversations in a loud tone of voice, regard others as sharing the admiring or sympathetic interest which they feel themselves."

5. Finally, Allport describes the "suggestion consciousness" of individual behavior in the crowd: "All marginal consciousness, all deliberative or restraining factors, and all critical attitudes are inhibited. Even the background of the consciousness of self, present in many of our more normal moments, is obliterated. There is a narrowing of the conscious field to the acts and feelings suggested. Emotional factors contribute to the effect." This analysis is obviously correct, but it is just as obviously at a far remove from radical behaviorism, for it is based on an introspective analysis of the awareness of an individual who in his response is carried along by the crowd.

The same inconsistency which we have found in Allport, appears in Weiss in another form. Weiss expends great ingenuity in constructing a system of naive physical monism based on physics and mathematics, in which the non-physical supposedly has no place whatever, and yet when he comes to the world of sociology—although in an article he has sought to expound a system of ethics on the basis of mathematical relations only—he has to invent a hybrid monster termed 'biosocial' who with apparently marvelous skill can, by way of legerdemain, transform biophysically incommensurate stimuli—e. g., today, aujourd' hui, heute—into biosocially commensurate, equivalent stimuli; and the same applies, of course, to responses. And thus through this miracle-performing agent, the individual is ushered into the com-

[1] *Italics,* Allport's

plex sociological world, classified as "educational, administrative, recreational and personal."* Grundlach points out †that Weiss here gives us a "sociological classification, a classification of human behavior from the standpoint of social organization"; "this analysis of human behavior . . . . neither explains nor describes the individual's performance; it gives neither functional nor structural differences in the individual acts which get themselves thus classified. These classes are not ways in which the organism functions." This is obviously a just criticism. With Weiss, as with Allport, seemingly, the non-physical and the qualitativve creeps in through the back door surreptitiously.

The organism plays a far more important rôle than the radical behaviorist usually conceives; importance of the brain. The life of man is far more complicated than is represented to us in the conception of the stimulus-response process by the radical behaviorist. We can readily appreciate this when we recall the immense neural complexity of the cerebral cortex which results from its vast number of neurones—9,200,000,000. The number of connections into which these neurones enter is literally beyond computation. Here in the brain, then, is the theatre, the center for information of the outside world by means of sensory receptivity and for the determination of innumerable responses. Bentley puts the radical behavioristic position sharply in relief, and for the most part correctly, when he says: Behaviorism "starting with the naive assumption of a ready-made physical world . . . . ends with a polarization of that world into two 'environments', the environment of stimulus and the environment of response, with the organism a sort of ineffective link between the two which neither initiates nor changes. The chair, the symphony, the invitation go into the hopper as stimulus and come uot again in response as chair handled, symphony visceralized and the invitation accepted. There they are again and the organism has incidentally twitched its striped and smooth muscles, exercised its voice and emptied its glands. This tendency to neglect the organism is very curious." Obviously Bentley has here indicated one of the most curious blind spots of the radical behaviorist. To be sure the radical behaviorists are interested in and informed on the cerebral cortex and the other parts of the nervous system as well as the other parts of the organism, but their interest is rather a minor one, or they conceive of the cerebral cortex merely as a receiving and forwarding station, and not as an organizing, integrating, initiating, creating agency. In other words they conceive of the brain in wholly physical and chemical terms as so much material tissue, and forget that it is also a living, throbbing feeling, thinking, organizing, integrating thing which has unique characteristics. Weiss may possibly be an exception to the rest

**Theoretical Basis of Human Behavior, Rev. ed.*, p. 145f
†Amer. J. of Psychology, 1927, 38, pp. 469ff

of the behaviorists in this matter of the neglect of the organism or of the cerebral cortex, but we are not sure that he is as much an exception as he appears to be. In the course of his definition of behaviorism, for example he indicates the three parts of the problem: "(1) the stimulating conditions (2) the sensory-cerebro-motor conditions, (3) the behavior conditions, as measured by both the biophysical and the biosocial responses." Then he goes into detail with respect to each of these, but nevertheless only very briefly as regards the second. Here is what he says on this: "*The sensory-cerebro-motor conditions* . . . . are to be regarded in the strictly neurological sense as including a study of the sensory mechanism, the so-called cerebral integrating mechanism, the central peripheral and autonomic nervous system, and the motor mechanism. From a study of these structures and functions the behaviorist learns the limitations that are imposed upon the types of behavior that may or may not be formed."* In this last sentence, we notice that Weiss is interested mainly in the "limitations", i. e., in the negative and, we might add, the merely mechanical aspects of these regions, and not in the possibilities, in anything creative or new originating there; he does, to be sure, mention "integrative mechanism." Throughout his book, like the rest of the radical behaviorists, he does, however, put the chief emphasis on the two factors of stimulus and response to the minimizing of the organism—especially the cerebral cortex—except as an ineffective link between the two which neither initiates nor changes." Watson states the radical behavioristic position very forcibly, thus: It is the implicit type of "behavior that the introspectionist claims as his own and denies to us because its neural seat is cortical and because it goes on without bodily portrayal." Watson cannot understand "why in psychology the stage for the neural drama was ever transferred from the periphery to the cortex." He elaborates this point more fully in an important footnote: "The tendency to make the brain itself something more than a mechanism for coordinating incoming and outgoing impulses has been very strong among psychologists and even among psychologically inclined neurologists. A still wilder hypothesis is held in regard to the neural impulse. According to many psychologists we are taught that an incoming impulse may be held *in statu quo* for long periods of time, or at least it may ramble around in the nervous system for an indefinite period of time—until it can "obtain possession of the motor field", at which time it exerts its effect. So far as we know no such thing occurs. The nervous system functions in complete arcs. An incoming impulse exerts its effect relatively immediately upon one system of effectors or another, as shown by inhibition, reinforcement, summation, phenomena in the muscle in operation, or by inciting

**Ibid.*, p. 144*

wholly new effectors to activity."* According to Watson's conception, then, the brain is nothing more than a mechanism for coordinating incoming and outgoing impulses, the nervous system functions in complete arcs, or as he says elsewhere, in reflexes, furthermore, the incoming impulses exert their effects relatively immediately. The hypothesis which Watson ridicules as being still wilder than the hypothesis which regards the brain as more than a coordinating mechanism seems to us obviously far more reasonable than his own radical behavioristic conception. His strenuous denial of it seems to savor very strongly of dogmatism. Can Watson deny that large portions of the brain consist of associatory areas which connect the sensory with the motor regions? Why should not an afferent impulse enter this associatory area, and instead of merely "rambling around" (Watsonian irony) establish logical, effective relations and other relations with the neural dispositions or traces built up by former experience, and also establish relations with other afferent impulses coming in at the same time? How otherwise explain the delay in deliberation, and hesitation, judgment, prolonged thinking and meditation? As we have already seen in the earlier part of this chapter, the nervous system does not function always in complete arcs: many afferent impulses never issue in motor discharges.

On the other hand, it seems to us that Warren is essentially correct in his criticism of radical behaviorism on this point, when he says: "that the significant factor in determining the responses is the integrative action of the central nervous system . . . .i. e., the central nervous operations determine the form of response in the first place, though the efferent impulses are modified from time to time by kinaesthetic stimuli."†

It would seem that in theory, the radical behaviorists could, in their systems, take account of the intricacy of the cerebral cortex, and accordingly recognize, its obviously decisive and dominant role in determining behavior. To this the reply may be:

1. In criticizing the radical behaviorists, we must consider what they actually say in their writings, and not what we should like to have them say, or what we think they ought to say. As a matter of fact we are not acquainted with the writing of any radical behaviorist which gives to the cerebral cortex the function of centrally determining, originating new forms of behavior. We have just seen that Watson is very emphatic and specific in his denial of this very point.

2. Therefore, to recognize the unique and vital importance of the cerebral cortex in the determining of behavior, the importance of the organism, appears to be contrary to the genius of radical behaviorism. The radical behaviorist seeks to be consistent with

*Behavior, An Intro., etc. p. 19f

†H. C. Warren:—Outline of a Psychological Standpoint:—*Washburn Commemorative Volume*, p. 38

his definition of psychology as the science or study of objectively or externally observable physical or physiological behavior; he is perforce interested only in stimulus and response. As we have seen in the chapter on The Radical Behavioristic Revolt Against Introspection, Watson, in discussing the "man in a brown study", says that the behaviorist is interested in the stimulus and the response, what goes on in between does not concern him.

3. It is, of course, possible to accept all the affirmations of the radical behaviorists concerning the rôles of stimulus and responses and yet reject their denials of the importance of what goes on in between. We could say: granted that the two environments are important, yet after all the stage of the neural drama is located in the cerebral cortex.

4. The radical behaviorists can, of course, consistently recognize the immeasurable complexity of the brain, in fact as scientists, they must accept the assured results of anatomy and neurology; but when they go further than this and mantain that, in spite of all this complexity, the brain is merely a forwarding station or an ineffective link, they are going counter to the obviously natural and logical inference that this complexity carries with it the unique effectiveness of function which we have already indicated.

Radical behaviorism's associations with biology have been and are so intimate that it would probably be a correct characterization to say that behaviorism is one of the children of biology. All of its major categories it has in fact taken over from biology, for example: behavior, stimulus and response, reaction, environment and organism. When, for instance, Watson remarks that he has written his psychology with the human animal ever in front of him, he is looking through the spectacles of biology. Now environment and organism, as Bentley* points out are the two great categories of modern biology. They began their career at least with Lamarck, and were "made especially prominent by Darwin and Spencer. Environments differ as organisms differ: whatever in the outer surroundings acts effectively upon an organism constitutes its environment. Corresponding to the complexities of the environment are the complexities of the organism and vice versa. The vagueness of the environment was strongest before the functional complexities of the organism were clearly apprehended." How true this is—i. e., interrelations of the two complexities—is obvious when we observe the familiar fact that although the outer surroundings may be the same, yet the environments are very different for the cat, the dog, the bird and for man; the same is the case for children in a family, although the outer surroundings are the same yet it is not the same environment, for one brother takes to agriculture or mechanics, to some branch of science, to literature, art, philosophy or what not.

*Environment and Context in *Washburn Commemorative Volume*, 54-61

What, then, is the selective factor which determines the environment? From the familiar facts just cited, the answer seems obvious: it is the organism, the different kinds of organism, the different characteristics in different organisms, the different characteristics even in the same species of organisms.

The behaviorists belong to the environmentalist school; the environmentalists are found in biology, sociology, psychology in history, in fact in all the social sciences. They believe, of course, that the life of any individual, of a social group, a nation or a race is completely explained when all the forces and factors in their respective environments are comprehended. The behaviorists represent this point of view in psychology. H. S. Jennings, however, in a remarkably acute and penetrating address on 'Biology and experimentation'* shows conclusively the inadequacy of the environmentalist doctrine. Jennings is the champion of the importance of the internal arrangement of the organism. He holds that the partial failure of Loeb and other environmentalists was due to considering the behavior of organisms as the resultant of outside forces acting upon tropistic and other simple and invariable mechanisms of the body. No matter how complete and detailed may be our knowledge of environmental media and energies and their immediate effect upon the organism, this alone does not take us far into biology. In addition to the environment, we must know the physical and chemical substances of the organism; a third fundamental is a thorough study of the gross and minute arrangement or organization of bodily structures. The same organic materials "under the action of the same agents, respond in the most diverse ways depending on how the materials are arranged." Jennings attributes the "grotesque failures of many promising experiments in biology to the neglect of internal arrangement and organization, with a corresponding exaggeration of environmental factors as the determiners of organic activities."[1] "A like neglect and exaggeration," as Bentley pertinently points out, "are to be found among those psychologists who experiment and write in terms of stimulus and response. Here the environment occupies the stage, the organism coming in only as an imperfectly known link between the incoming and outgoing energies, which are wrongly equated as environmental cause and effect, stimulus and response." Bentley is in agreement with the Gestalt psychologists and many others "who look upon the organism as yielding functional totalities under the conjoint action of internal and external integrations and not as merely transmuting outside 'stimuli' into outside 'responses.' Under this view the atomistic conception of the environmental relation is rejected for

*Science 64, 1926

1Jennings in a paper of The Theory of Tropisms 1903 says he found "in all well known reactions of unicellular organisms and rotifers (except in a portion of the reactions to the electric current) determined by an internal factor and predictable from the structure of the organism without any knowledge of the direction from which the stimulating agent is to come."

integrative resultants which shift and change with the whole physical configuration of inside and outside factors." Finally Bentley puts the whole matter most excellently thus: "The integrative study of the internal relations and unities will continue to reveal more and more the most intimate facts about the nature of living beings. We certainly gain in logical clearness and simplicity when we realize that all of our study of inner and outer relationships fall under the single category of context."* These statements by Jennings and Bentley appear to me to be thoroughly sound, and to present a comprehensive conception of the matter in hand; furthermore, they constitute a penetrating and thoroughgoing criticism of the conception of behavior as a stimulus-response process and replace the partial and wholly inadequate doctrine of radical behaviorism with a complete and adequate point of view.

Although Koehler expresses himself differently, his position is practically in agreement with that of Jennings and of Bentley in its insistence on the importance of the organism and of its internal arrangement and organization, especially of the cerebral cortex. In his chapter in the *Psychologies of 1925*† he shows that we have a dense net-work of conductors between the sense organs and the reactor organs. "Conduction can be explained similarly to the process-distribution in physics." Koehler states three assumptions on which his investigations into the mentality of apes were based:

(a) "In the higher animals, some parts of the central nervous system are the places of the sensory processes, corresponding to the stimuli from without, just as in certain fields of the brain in man are shown by overwhelming evidence from pathology to be the stage of sensory processes."

(b) The net-work of conduction (i. e., between the sensory organs and the reacting organs) organizes stimuli very differently than if there were just isolated stimulus-response processes.

(c) "The distribution or organization of sensory processes shall not depend upon the constellation of stimuli only, but upon the total interior situation in the animal," e. g., hunger, rage, fatigue, etc.

Extend the term Gestalt (configuration) to include not only the outer constellation of stimuli, but also the total interior situation of the organism making the outer constellation of stimuli dependent upon the interior situation, i. e., making the interior situation dominant, in other words determinant as to what constellations of stimuli shall be stimuli for the organism, and equally determinant as to reactions, and we have the exact equivalent of Bentley's position when he speaks of "all our study of inner and outer relationships falling under the single category of context."

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*Bentley:—*Ibid.*

†p. 154f

PART II

Chapter 16

CRITICISM OF THE CONCEPTION OF THE TRIAL AND ERROR PROCESS

Rôle of the trial and error process in behaviorism. The complement to the conditioned reflex in radical behaviorism is the process of trial and error. The conditioned reflex, as we have seen, is held to explain the modification of afferent behavior; so likewise is it claimed that the process of trial and error explains the modification of efferent behavior. To establish this thesis, the radical behaviorists have exercised a world of patience, expended infinite labor in observation and in innumerable experiments. Central in the conception of trial and error are what are termed 'recency' and 'frequency' of trials. 'Recency' and 'frequency' are believed to play the role of determiners in helping the organism to distinguish between that which is successful or correct and that which constitutes error. It is thus through a continuous process of experimentation, as it were, that the organism learns and grows in knowledge and wisdom, and makes successful adjustments to its environment and its world. Watson* says: "Some attempted causal explanations of the process of fixation are as follows:

(1) In most cases where random activity finally leads to success, the successful group of acts is always last to appear; hence when the next trial is given the last group active in the preceding test (the successful one) is thus the one most recently exercised; therefore, other things being equal, it will be the one most likely to occur first, or at least early in the second trial.

(2) In view of the fact that the random acts are infinitely varied the successful act is the only one performed each time the stimulus is presented. It, therefore, becomes the most frequently performed movement."

The whole efferent side of behavior of animal and man is thus explained by means of the process of trial and error: instinctive, habitual and reflective; all thinking and reasoning are nothing but trial and error behavior.

Criticism of the trial and error theory. Since the trial and error process is thus so fundamental, it is highly important that we scrutinize it carefully. Since, however, we criticize elsewhere comprehensively the stimulus response process, the conditioned reflex and the behavioristic theory of thinking it is not necessary to elaborate the criticism of the trial and error process so fully

*Psychology from the Standpoint, etc. p. 315

as would otherwise be advisable. The question we have to ask, then, is: Is the trial and error method sufficient to account for the modification of the efferent side of behavior?

Jennings on what constitutes 'error' and 'success'. H. S. Jennings in a paper entitled, 'The Method of Trial and Error in the Behavior of the Lower Organisms'* discusses the question: What determines or constitutes 'error' and 'success'? While the date of this paper antedates radical behaviorism, yet it seems to us to bring out one very good point in the criticism of the radical behavioristic conception of the method of trial and error. Jennings answers the above question as follows:

(1) So far as chemical and physical classification is concerned the list of such (erroneous) reactions is a most heteregeneous and even contradictory collection.

(2) A further question which he thereupon asks is: "What is the common factor which makes them all error?"

(a) The answer to this is: Error is as a rule such "from the standpoint of the general interests of the organism, considering the general interests of the organism to be the performance of its normal functions, the preservation of its existence and the production of posterity. In general the organism reacts as error to those things which are injurious to it, while in those conditions which are beneficial it continues its normal activities."

(b) Jennings asks again: "Why is it the organism reacts by a negative reaction to those things which are injurious?" He prefaces his reply by saying that the problem is identical for both lower organisms and man. Then he continues: "If in the case of man, we cannot account for negative reactions on wholly physical and chemical terms without the consideration of the consciousness of pain, then we cannot do the same for lower organisms. The problem is one, so far as the objective evidence goes, throughout the whole animal series." The same considerations as apply to error, apply *pari passu* to pleasure (success), although the matter would be more difficult to work out, and Jennings does not work it out in this paper. He does add one remark, however: "When the conditions are favorable, the organism continues the condition in which it finds itself at the time." Jennings points out that the phrase "method of trial and error" as he is using it is equivalent to the phrase "selection of overproduced movements" as used by Spencer, Bain and Baldwin. He is very outspoken in his rejection of the tropism scheme. He says, it leads nowhere, while "the method of trial and error is flexible; indeed, flexibility is its essential characteristic." It leads upward. Then he quotes with approval from Lloyd Morgan's *Animal Behavior (1900)*, p. 138, the proposition that the method

*In a collection of papers:—Contributions to the study of the Behavior of the Lower Organisms, VIIth Paper, 1904, pp. 237-252

of trial and error is the method of intelligence. "The method of reacting which leads to success is determined by trial; after it is once or several times thus determined, the trials are omitted and the organism at once performs the successful action. This is intelligence."

In a footnote, Jennings calls attention to his usage of the following terms in an objective sense: "perception" of a stimulus merely means reaction to the stimulus in some way; "discrimination" means a difference of reaction; "intelligence" is defined by the objective manifestations discussed in the paper. He uses in a subjective sense, however, the phrase, "consciousness of pain."

The main point in Jennings' account is that error is defined in terms of biological behavior as the reaction which causes pain, and which usually is injurious to the organism; on the contrary, success is defined as the reaction which produces pleasure, and which is usually beneficial to the organism. Jennings agrees with the radical behaviorists in the estimate which he puts upon value of the method of trial and error; he disagrees with them, however, in assigning the determining rôle to *consciousness of pain and pleasure* for which the radical behaviorists naturally have no place in their system. The radical behaviorists agree that error is that which is inimical to the interests of the organism in its normal functioning, and that success is that which is beneficial. It seems to us that over against the radical behaviorists, Jennings is fundamentally correct.

Troland approaches Jennings' account. Troland in his book, *The Mystery of Mind,* presents an account of trial and error which approaches somewhat the account of Jennings, though it is in neurophysiological terms.* He classifies all sense organs and their accompanying nerves into three groups: (1) those which discourage cortical connections, (2) those which encourage such connections, (3) those which are neutral in the given respect. "The cortical discouragers include all the wide variety of nerve channels which are associated with the experience of pain." For example when the baby sees a candle flame for the first time, and puts its finger into it and is burned, the discourager the second time the baby sees the candle flame breaks up the cortical connection of the excitation which would lead it to again put its finger into the flame. The cortical encouragers act in the contrary fashion, to facilitate action. The neutral senses are those which give us our representation of reality, regardless of the question of our welfare; they are the senses of vision, hearing and touch. At the close of the chapter Troland says that this account is given wholly in neurophysiological terms and "is thus admittedly incomplete and introductory." He supplements it later on in the volume by thinking as symbolic trial and error, which we shall discuss later in another connection.

*p. 122ff

Beatrice Edgell accuses Jennings of petitio principii. Beatrice Edgell in her book, *Theories of Memory** accuses Jennings of *petitio principii.* She says: "on the one hand, Professor Jennings' observations make him reject tropism and reflexes as an adequate basis for constructing an historical account of behavior. On the other hand, his desire to be 'objective' in his methods leads him to avoid any overt attribution of consciousness to the organism studied. Yet when he infers from a comparison of lower and higher organisms that since they behave alike, and the higher are conscious, therefore, it is probable that the lower are conscious also, is he entirely free from the charge of *petitio principii?* Does the objective method which seeks to be historical succeed in avoiding the horns of mechanism on the one hand and of panpsychism on the other?" These questions, she holds, are important, because the method of biology has been taken over by psychology, but by reasoning in a converse fashion, namely: since animals can be studied without the attribution of consciousness, therefore, human beings can also be thus studied.

Reply to Miss Edgell. From the standpoint of formal logic, Miss Edgell is obviously justified in accusing Jennings of a petitio. Moreover her reasoning may go one step farther than she intended: the psychologists—namely, the radical behaviorists—who reason in a converse fashion just as obviously commit a petitio. In view of this situation, we can then do one of two things:

(1) We can select the most plausible, although seemingly illogical, underlying hypothesis of these alternative petitios; on this ground Jennings' hypothesis would seem to be preferable. Not only does it seem prima facie to be a more plausible and natural hypothesis to entertain that animals have consciousness, than to maintain the contrary, but experimental verification can also be found in support of the thesis that a more satisfactory explanation of animal behavior can be given thus.

(2) Or, we can shift our ground, as Jennings has done, to radical experimentalism, i. e., follow most scrupulously at all times the lead of observation and experiment, bearing in mind, that only thus and not by ratiocination "can be discovered the new things that come in evolution, the new modes of action:" When formal logic, i. e., "the reasoned conclusion conflicts with experiment, it is the reasoned conclusion that must give way." If reasoning seems thus to have been cast down from its high estate, it is only for the sake of making clear what its proper limited function in this setting is. What this is Jennings points out when he asks† "For what are reasoning and computation good? They are good as guides to the next experiment, the next observation," to choose what experiment, or modification in the last experiment

*1924, Oxford, Clarendon Press

†*Ibid.*, p. 21

to make next. And again when he says: "The man of science must accept as the final word John Hunter's maxim: 'Don't think; try! Thinking is an instrument, a very fallible instrument, for helping to decide what to try, but the *last* word must be *try*.'" Because of the importance of the matter under discussion, let us, even at the risk of repetition, quote Jennings' own restatement: "For any organism or society separated from others by steps in emergent evolution, the only possible method for progress is by trial and error. In such progress by trial and error will indeed be found free play for the utmost sharpness of vision as to what it is best to try, and for all possible astuteness of judgment as to what has turned out error; but in the end *a trial* it must be, with no antecedent certainty as to the results." Of course, the obvious purpose of both Hunter and Jennings is to utter a protest against the uncontrolled use of reasoning. It is important, however, to note that in Hunter's maxim while thinking is a fallible instrument, it is nevertheless within limits a necessary instrument; and that in Jennings' conception 'sharpness of vision,' 'astuteness of judgment' form integral parts of the process of trial and error. But if this is true, then 'feeling or consciousness of pain and pleasure' also enters in as an important factor. This doctrine of Hunter and Jennings is very different from that of the radical behaviorists, inasmuch as the latter do not have any place for these mental activities in their conception of the process of trial and error. The theory of the former is obviously more adequate than that of the latter.

Brief digression—what we find by means of Jennings' method. The determinism of radical experimentalism, says Jennings, "is not concerned with likenesses or differences in kind, as between mental and physical, nor with the conceivability or inconceivability of causal relations between them; it is purely a matter of experiment." He continues: "If we rely solely upon experiment, the production of mental diversities by preceding diversities in physical conditions is the commonest experience of mankind; a brick dropped on the foot yields other mental results from a feather so dropped." And vice versa, "one result follows when a certain mental state precedes; and another when another mental state precedes, and this is exactly experimental determinism." Jennings, therefore, finds that "according . . . . to radical experimentalism consciousness does make a difference to what happens; particular types of consciousness make a difference. Emergent evolution asserts this from another point of view; the conscious emergent is one that acts on different principles from the unconscious one. The two doctrines (radical experimentalism and emergent evolution) are here again one." "Among the determining factors," then, "for the happenings in nature are those that we call mental. Thoughts, purposes, ideals, conscience do alter what happens. That is, a man with an idea behaves diversely from a man without one . . . . The desires and aspirations of

humanity are determiners in the operation of the universe on the same footing with physical determiners."

How Jennings avoids the horns of the dilemma. There remains for consideration the question put by Miss Edgell: How can Jennings avoid the horns of mechanism on the one hand and of panpsychism on the other? As a basis for the answer, we must first ask what, according to Jennings, are the relations to each other of radical experimentalism and emergent evolution? Each leads to the other; "they are indeed obverse views of one doctrine." Jennings' answer, then, is that the doctrine of emergent evolution "combines the advantages of mechanism and vitalism, dismissing the ineptitudes of each." To vitalism, we may, in the sense of the preceding paragraph, add panpsychism, but in so doing we must be careful to distinguish between at least two different kinds of panpsychism: (1) metaphysical panpsychism which embraces not only the organic, but also the inorganic realms, and (2) vitalistic panpsychism which does not extend into the inorganic realm. Judging from his writings, Jennings is a panpsychist in the latter sense. Jennings proceeds further to point out how biology can combine mechanism and vitalism: the notion that the best interpretation of the living consists in the exclusive study of the non-living condemns biological science "to move in pretentious superficialities." As set over against this, "emergent evolution demands a study of the inorganic for the sake of the organic. Since the activities of the constitutent parts in the living are modifications of their simpler actions in the inorganic and since many of the simpler actions too persist in organisms, a knowledge of the inorganic must continue to be the foundation on which to build an understanding of the organic. But the constituent parts act differently within the organic, for they have come into new relations; the laws of action of atoms and molecules are not fully known till they are examined in organisms. The experimental method is as valid and indispensable in the living as it is in the non-living."

Lovejoy's criticism of Watson's theory of recency. Watson's theory of recency as a determiner obviously carries with it the strange implication that we cannot ever break away from behavior in conformity with the most recent act, whether true or false, successful or unsuccessful.

Thorndike's criticism of 'frequency'. E. L. Thorndike in a review of Watson's book, Behavior, An Introduction to Comparative Psychology*, presents a very convincing criticism of 'frequency', as an explanation of learning. He states it in the form of a table as follows:

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*J. of Animal Behavior 5, 1915, pp. 462ff

Situation S	Trials	Days	Responses
"	1	1	1, 2, 1, 1, 1, 2, 1, 1, 3, 1, 1, 1, 4*
"	2	2	1, 1, 1, 2, 2, 1, 2, 3, 5, 1, 4
"	3	3	1, 2, 1, 1, 6, 1, 3, 1, 4
"	4	4	1, 1, 2, 1, 4
"	5	5	1, 3, 1, 1, 4
"	6	6	1, 2, 1, 3, 4
"	7	7	1, 2, 1, 4
"	8	8	1, 4
"	9	9	4
"	10	10	4

Thorndike points out that such cases of learning are very common. "Here response 1 starts out with a frequency of 8 to 1, and yet loses in the end."

W. R. Wilson's criticism of frequency. W. R. Wilson† offers four criticisms on the principle of frequency of repetition:

(1) "Since the successful reaction ends the trial, it is selected the least number of times, which is contrary to Watson's assumption and statement."

(2) It "does not involve circularity of activity, but circular activity is just what has been observed in experiments."

(3) Again, "if each repetition of an act increases the probability of its repetition on a succeeding trial one would expect" the unsuccessful reaction to be repeated more than the successful one.

(4) Finally, "the principle of frequency does not explain why the culs de sac after sufficient training not only fail to arouse the entering reaction as at first, but arouse a positive avoidance reaction, so that the correct pathway being barred, the animal will fail to enter the cul de sac until driven by unusual hunger or fatigue."

Wilson also calls attention to the fact that Watson himself says that the principle of frequency is difficult to apply, and that its influence in maze learning cannot well be made out.

Wilson's motive in writing his article was to answer McDougall's recent challenge—in his *Outline of Psychology*, p. 186—to any mechanist to explain the shortening of the trial and error series in terms of mechanical bodily movements. Wilson having through his thorough-going criticisms rejected the method of trial and error as an explanation of learning, then presents his own solution. In the method of trial and error no account is taken, he rightly points out, of selection. Selection, however, he claims is accounted for by the conditioning process, that is, the approach

*Bringing food

†Trial and Error Learning, Psychol. Rev. 31, 1924, pp. 150-160

stimulus is conditioned by the avoidance reaction; for example, when the chick approaches or sees a cinnabar caterpillar for the second time, or when the babe approaches or sees a candle flame for the second time; on the other hand, in the contrary situation in which the result following upon the previous stimulus was good or pleasant, the approach stimulus is conditioned by a seeking reaction. In addition to the conditioning process, Wilson also mentions the overlapping of compatible movements.

Upon this our comment is, that this conditioning process is in effect the principle of the conditioned reflex, which we have already elsewhere fully criticized. It will be sufficient, therefore, to emphasize one point. In the beginning of his article, Wilson rightly pointed out the importance of selection for the solution of any problem of learning. It seems obvious that selection cannot be at all accounted for in mechanical terms. Hence the conditioned reflex cannot—since it is as we have seen, mechanistic throughout—have any place for the fact of selection. Selection is a mental process requiring qualitative distinctions, is centrally initiated, and furthermore presupposes some integrative unity, or organizing principle as a back-ground or fundamental ground in relation to what Jennings calls the general interests of the organism.

Assumption of both the principle of the conditioned reflex and of the principle of the trial and error process—the organism is a machine. The assumption of both these principles is that the organism, animal and human is nothing but a machine, a very complicated machine, to be sure, but after all only a machine. That is, everything which goes on, can, supposedly, be completely explained in wholly mecanistic, i. e., physico-chemical terms, and in mathematical terms. In other words, as Franklin Fearing would put it, the mind can be wholly accounted for in number and measure. From this point of view we emphatically dissent. How an organism is fundamentally different from a machine, we have discussed in the chapter "The Criticism of the Stimulus-Response Process," and in the Critical Summary. We wish especially to emphasize in the present connection the qualitative aspects of the organism's functioning, its capacity of integrating, of organizing, of selecting with reference to the totalities of its interests.

Köhler's conception of 'the method of insight' and the behavioristic conception of 'the method of trial and error.' The radical behaviorists maintain that these two conceptions are opposed to each other; they therefore unhesitatingly reject the former, and stoutly advocate the latter. The advantage of Köhler's conception of the method of learning over the radical behavioristic conception has been clearly pointed out in an able article by Miss Gilchrist*: 'A New View of Mental Development.' The part which

*Psychol. Rev. 31, 1924

'insight' played in Köhler's experiments on the learning of apes, as set forth in *The Mentality of Apes,* is so familiar that it is sufficient to merely point out that when the animals were given problems within their capacity to solve, Köhler proved that insight reached by means of reasoning played the determining role in the solution and that the apes showed by their behavior that they knew they had the right solution; after that, trial and error entered in only as efforts to find the right means to achieve the end; often this end was achieved immediately, i. e., without any trial and error. Insight and its attainment are obviously not mechanistic processes. Furthermore, it is perfectly obvious that no real learning can take place without insight. It certainly appears to be a *reductio ad absurdum* to speak of a machine having an insight, an understanding, a comprehension of a problem, an event or a situation.

The truth of the matter, however, is that it is obviously a mistake to conceive of these two conceptions of method as exclusive alternatives. This mistake of the radical behaviorists goes, in part, back to their fundamental error of considering mechanism and teleology as mutually exclusive. We shall discuss the relation of mechanism and teleology in the chapter "Critical Summary." It will, therefore, suffice here to point out that both—(1) the two conceptions of the method of learning, and (2) the relation of mechanism and teleology—instead of being opposites are, rightly viewed, complementaries. We have already seen in the preceding paragraph how 'insight' and 'trial and error' may be combined as 'end' and 'means'. Further reflection discloses that 'end' and 'means' may be most intimately conjoined in the very process of trial and error itself. We need, however, to distinguish for our purposes here between several kinds of 'ends'. There is first of all the kind of 'end' discussed above: the 'end' of which insight is gained by a process of reasoning; this end is clear, definite and certain. Then there is the 'end' whose meaning flashes upon us instantly; we may call this the 'intuited end'; of course, it may or may not be the result of long brooding and anxious searching. A third 'end' may be only very vague and indistinct, an indefinable longing, a pressing discomfort, or discontent, in the mental realm; or it may be an organic malaise. In between the first and the third, there may be, of course, a great variety of gradations of 'ends'. It is obvious the second 'end', if it is the result of brooding or search, is intimately connected with the trial and error process, likewise also the various gradations of 'ends' between this part of the second and the third. So we may say to the radical behaviorists: 'trial and error method, yes; but the dice are loaded against you; without some degree of consciousness of end, there would be no trial and error. What impels the white rats to run the maze? Is it not some vague awareness of the necessity of finding food to satisfy their hunger?' We are not saying that a white rate has such a consciousness of

this as a human being would have. But looked at from the rat's point of view there must be presumed to be some kind of a germinal dim awareness of an 'end'. Consciousness of an 'end'—however vague and weak, or however clear and intense—in the last analysis thus constitutes the motive power, the driving impulse which initiates, and constantly compels the continuance of, the trial and error process. This important fact is lost sight of or purposely read out of court by the radical behaviorists in all of their discussions of the method of trial and error.

Is internal trial and error in reasoning merely a physical process? Is it correct to say that the integral trial and error method in reasoning is merely a physical process identical with external trial and error such as for example when we see a rat running a maze, or trying to escape from a burning building, or from a mine which is caving in? Allport in his *Social Psychology* says that the identity is complete; in other words, he says that the behaviors of the rat and of the man in seeking to escape from a burning building are exactly identical, i. e., the trial and error methods in both are nothing by physical processes. The only difference is that in the case of the man, the trial and error is physically internal and abbreviated. With the man, that is, there takes place a trying on of this or that method of escape without overt behavior; there is a symbolism by means of a substitution of words, in place of the blind and excited running about of the rat. Although these words are grouped in phrases, sentences and propositions, nevertheless this symbolism or substitution is nothing but physical. That is, words are nothing but sound vibrations; there is no psychical meaning, nothing mental. Sound vibrations—merely physical events—stand for, are substituted for other physical events—organisms running wildly about. We have here a beautiful illustration of the "nothing but" fallacy. By the "nothing but" fallacy is meant that the whole or totality of the parts of any given process or event is conceived to be exclusively identical with or equivalent to some one of its essential parts. Thus both the means and end or purpose are, as the case may be conceived to be, either reductively equivalent to merely the means or instrument, or to be thus equivalent to merely the end or purpose. Or, a concomitant pair or any other duality is held to be reductively equivalent to but one of its members; for example, mental and neurological processes, sociological and biological processes may be conceived as consisting reductively only in physiological processes. We may also call this fallacy a species of the fallacy of over-simplification; in effect it likewise makes the part stand for the whole. The conception that words are "nothing but" sound vibrations is the same class with such other examples of this fallacy as consciousness is "nothing but" cortical action, or courtship and marriage are "nothing but" a functioning of the sex glands, or of the

erogenous zones. Of course consciousness is necessarily and most intimately associated with cortical action but it includes far more than merely neurological activity, and has characteristics which are obviously very different from those of the activity in question. Analogous reasoning holds true of courtship and marriage and the functioning of the sex glands. The correct way of statement is to substitute for "nothing but", the phrase "except for", that is: "except for" cortical action, consciousness could not take place; "except for" the functioning of the sex glands, or of the erogenous zones there could be no true marriage in which there is the begetting of children; so likewise, finally, "except for" sound vibrations, there could be no words, nor language, nor discursive thinking, nor reasoning. That is, words are far more than sound vibrations. When performing their proper function in language, and especially when combined to form propositions, words carry within themselves a vast and complex system of mental and emotional symbolism.

VITA

The author of this dissertation was born in Holt, Michigan, November 9, 1873. He received his early training in the public schools of the state of Michigan. He was granted in 1900 the degree of Ph. B. by the University of Michigan. Here his interest in philosophy was aroused especially by Wenley; he also owes much to Lloyd and Rebec. He attended Hartford Theological Seminary 1900-1902, and graduated from Union Theological Seminary in 1903, by which institution he was awarded the degree of B. D. in 1904. He pursued graduate study in 1904-1908: (1) in philosophy in Columbia University where he came in contact with the different points of view of Dewey, Montague, Woodbridge, D. S. Miller, C. A. Strong, W. H. Sheldon, and G. A. Tawney; (2) in philosophy of religion, church history and doctrine, and systematic theology in Union Theological Seminary under Knox, McGiffert, and W. A. Brown. Columbia University gave him the degree of M. A. in 1915. He took graduate work in German in Columbia University in the summer sessions of 1916 and 1917 under Hervey, Remy, Boehme and Coar. He was Fellow by Courtesy in the Johns Hopkins University in 1919-1920, a graduate student in Philosophy, psychology and political science 1922-1924 under Professors Lovejoy, Boas, Dunlap and Willoughby; and received from Johns Hopkins the degree of M. A. in 1925.

He was a Presbyterian clergyman from 1908-1914; Professor of German and French in Waynesburg College 1914-1917, and Professor of Philosophy and Bible from 1917-1919; he also held the latter chair in Piedmont College from 1920 to 1922; Professor of Philosophy and Psychology in Tarkio College, 1924-1925, New River State College (Branch of West Virginia University) 1925-1927, and in Hanover College 1927-1931.